



BroodMinder



Hive monitoring
simplified

HCDE Capstone, Spring 2021

Natalie Goetz • Crystina McShay • Kathleen Parsons • Julia Robison

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Introduction

- Summary
- Team Bios
- Design Question
- Project Scope
- Process Overview



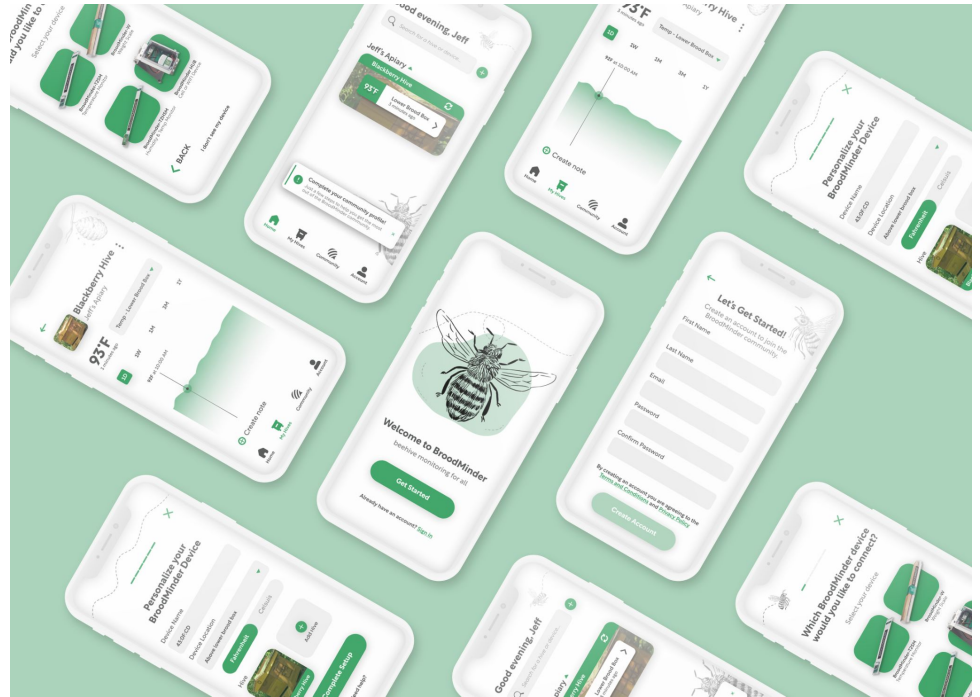
Summary

The bee population is dwindling due to mites, pesticides in farming and viruses. Hobbyist backyard beekeepers work hard to save our bees.

BroodMinder creates IoT hive monitoring devices that allow beekeepers to perform simple, uniform measurements in their hives and track the activity and health of their bees.

The current device pairing and onboarding process for BroodMinder is over-complicated and doesn't set beekeepers up for success so that they can use their data and achieve their longer term goals.

Our hypothesis is that an improved onboarding experience will lead to longer term customers and more engagement with the app.



Team



Natalie Goetz

Natalie works at an ed-tech startup, Varsity Tutors/Nerdy Technologies as the sole researcher, conducting both qualitative and quantitative research. She loves applying what she learns in HCDE to her role at work.



Julia Robison

Julia is Sr. Product Manager at Amazon where she most recently builds marketing tools for self-published authors and has uncovered a passion for UX Research and Design. She has a personal connection to our partner, BroodMinder, and is excited to provide them with insights and suggestions for an improved UX.



Crystina McShay

Crystina is full-time master's student studying to become a UX researcher. She previously worked in ed-tech developing adaptive online math assessments and writing workbooks for K-12 school districts across the country.



Kathleen Parsons

Kathleen works in product management at a finance tech start-up that focuses on software integrations within the financial and real estate industry. She is enjoying the challenge of building out the UX space in her organization.

Design Question

How might we design a **seamless onboarding experience** for new BroodMinder customers that sets them up for long term success?

Project Goals

Simplify the process, making it quick and easy to follow.

Keeps users informed along the way so they feel confident and in control.

Allow users to seek help or move back in the process when needed.

Sets users up for long term success with their hive monitoring devices.

Project Scope

Unboxing

First impressions are important – how an IoT product and its instructions are presented out-of-the-box can have a major impact.

Device Bluetooth pairing

We wanted to make the pairing process uncomplicated and straightforward for all users, regardless of their tech-savviness.

Onboarding

Onboarding can set customers up for success, and we found the BroodMinder's primary pain point was guiding users through their device and account setup.



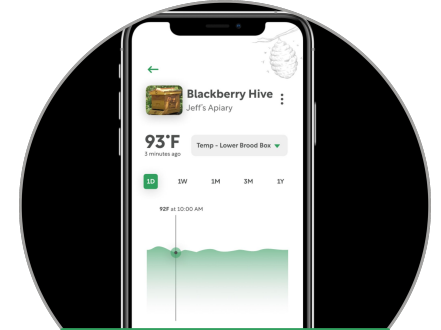
Process Overview



RESEARCH



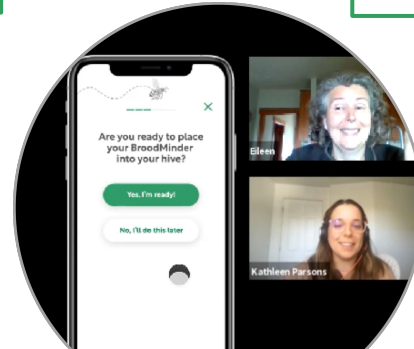
PROTOTYPING



FINAL DESIGN



IDEATION



USER TESTING



Research

- Research Overview
- Auto-Ethnographic Study
- Competitive Analysis
- Usability Testing
- BroodMinder Interviews
- Key Findings
- Personas
- Journey Mapping



Research Overview

We conducted four research activities to better understand the goals and mindsets of our target audience and our problem space.

4

Auto-Ethnographic Sessions

In order to better understand the current BroodMinder onboarding, each team member conducted an auto-ethnographic session by going through the complete device pairing and onboarding process with a brand new BroodMinder device.

5

Competitors Analyzed

We researched and documented the onboarding processes of 5 other IoT devices. This helped us compare the BroodMinder onboarding to other existing processes. We identified some best practices that we could leverage in our solution.

5

Usability Testing Sessions

We tested the existing BroodMinder device setup and onboarding process with beekeepers to better understand their thoughts, frustrations and pain points. We captured quantitative data to benchmark the experience so that we could measure improvements made in subsequent testing.

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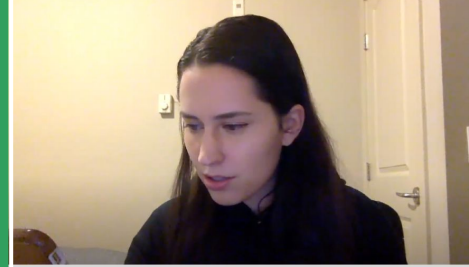
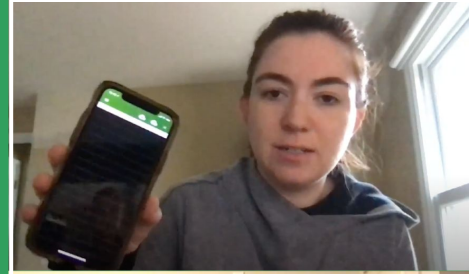
Interviews Conducted

We interviewed 4 relatively new BroodMinder customers in order to better understand their goals and motivations when beekeeping and how BroodMinder helps them take care of their bees. We also captured their thoughts and feedback about their experience with BroodMinder.

Auto-Ethnographic Study

We conducted Auto-Ethnographic Diary Studies in which **each team member completed the setup process for the BroodMinder-T2SM device** with the final goal of viewing temperature data recorded by the device. Team members answered a set of prompts before, during, and after the set up.

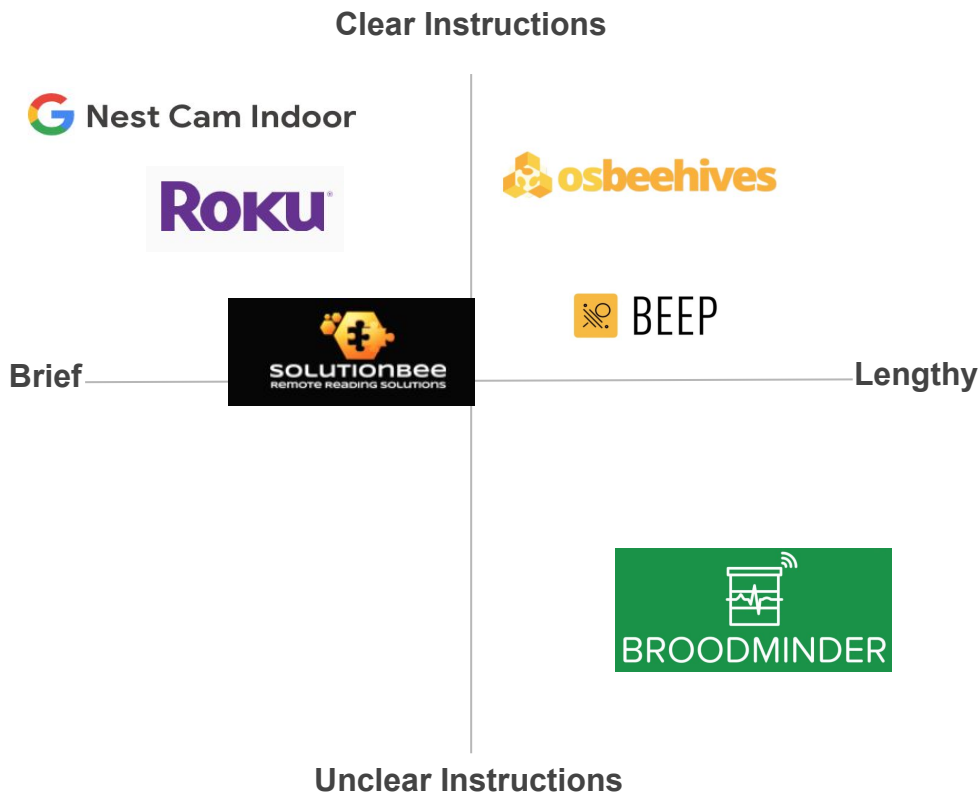
We felt that this method was required to be completed first, as it served two main purposes. First, **it served as a sort of heuristic evaluation for the team to identify points of confusion or low usability.** Secondly, this method allowed the team to better understand the set up process in order to design the subsequent usability study. We discovered and documented many pain points and ultimately built a lot of empathy for our users.



Competitive Analysis

We documented and analyzed the onboarding and set up processes of three competitor beehive monitoring devices (BuzzBox, BEEP, and Solution Bee) and two IoT home devices (Nest and Roku). For each product, we documented an overview of the set up steps, images of the process, time to complete, and completed a brief heuristic analysis of each procedure.

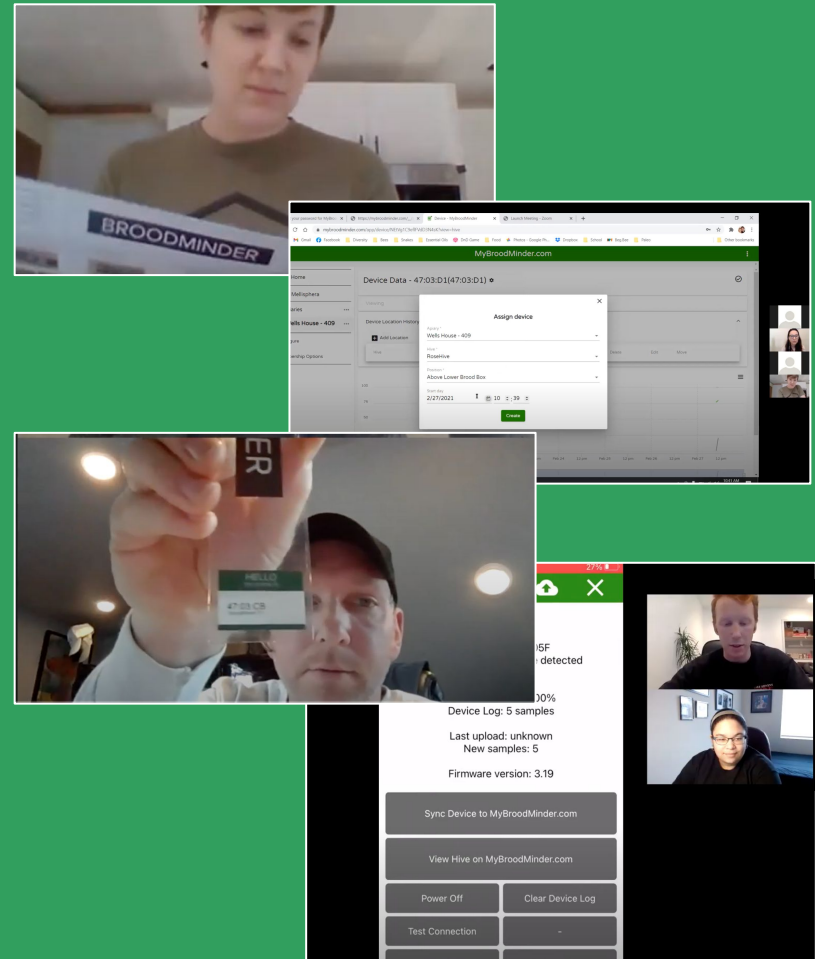
We discovered common patterns and design decisions that other companies used in their setup processes. We learned that our onboarding process should guide users step by step, allow them to exit or go back when needed, use minimal instructions and keep users informed of their progress along the way.



Usability Testing

We tested the unboxing, device setup and onboarding process of the BroodMinder T2SM temperature monitors with 5 beekeepers. Each beekeeper received a brand new device and setup instructions in the mail. In a moderated session, we observed participants as they followed instructions and set up their device to begin viewing hive data.

The usability sessions reaffirmed many of the pain points discovered in our auto-ethnographic study as well as highlighted some other important insights. Overall, we found that the process was unnecessarily long, complex, and the instructions were often more confusing than helpful. Participants tended to skim or skip over instructions and they desired an all in-app setup that didn't have them switching between desktop and mobile.



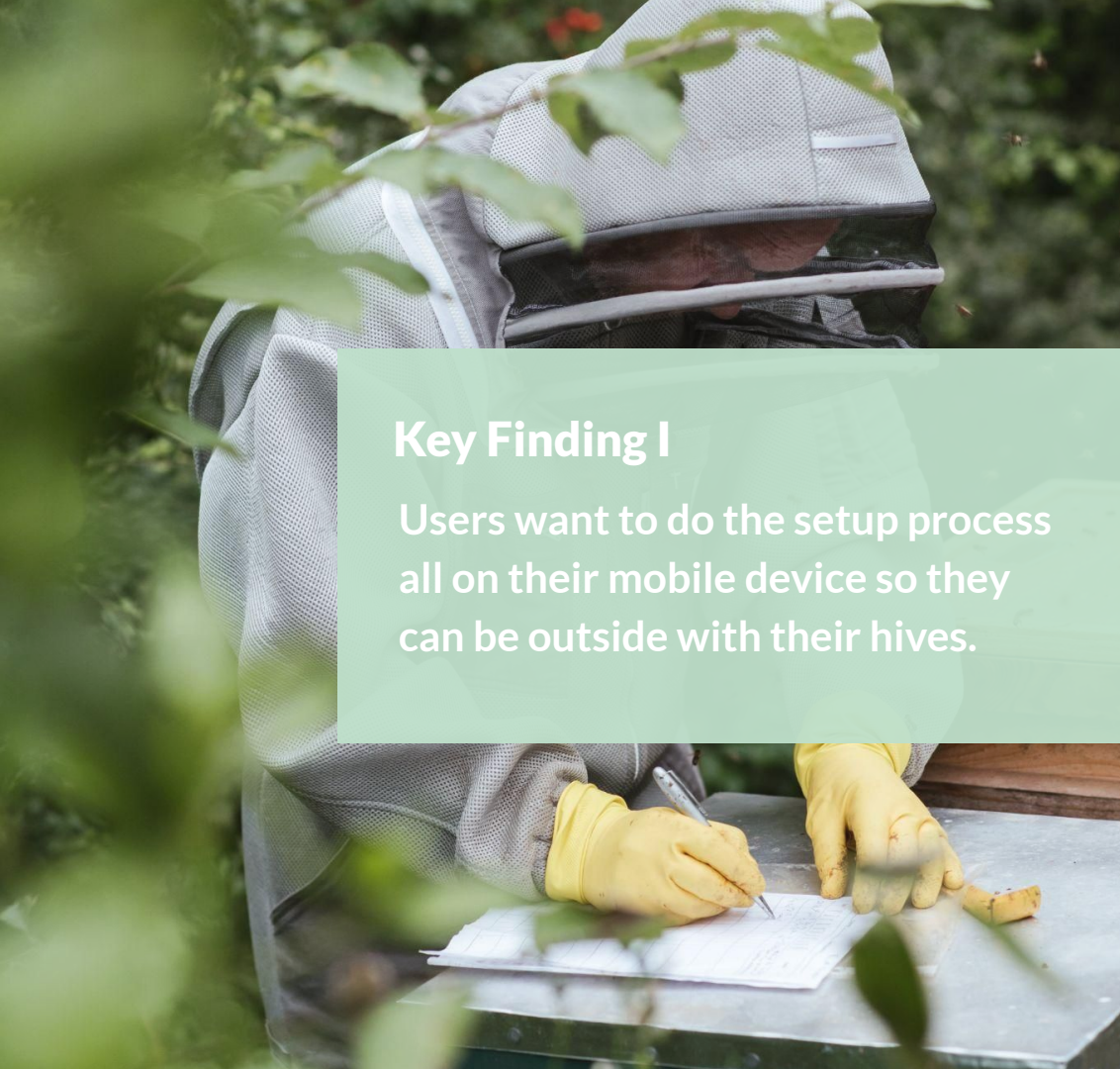
BroodMinder Interviews

After capturing a lot of data around the existing onboarding and setup process, we felt that we needed to **better understand the goals and motivations of our target users, hobbyist beekeepers**. We recruited and interviewed 4 relatively new BroodMinder customers who shared about their experiences with beekeeping as well as their experience using their BroodMinder devices to help them monitor their hives.

These interviews helped us develop a more well-rounded understanding of beekeepers and create our 2 primary personas. We **learned more about how beekeepers keep track of their hives** and how they leverage community relationships to help them learn and take better care of their bees.



“There are times when I’m out in the yard, when it would be handier if the... user interface on the app was better, so that I could get better information as I am out there in the hive.” -P4



Key Finding I

Users want to do the setup process all on their mobile device so they can be outside with their hives.

How it informed our design solution

We made the entire onboarding and setup process within the BroodMinder app on mobile. This made it easier for users to be on the go and not have to context switch between desktop and mobile.

The background of the slide is a photograph of a rural setting. It shows a small, simple building with a corrugated metal roof and a door, partially obscured by dense green foliage and trees. The scene is brightly lit, suggesting daylight. A semi-transparent green rectangular box is overlaid on the left side of the image, containing text.

Key Finding II

All usability participants had difficulty identifying the correct instructions to follow for onboarding and setup.

How it informed our design solution

We simplified and reduced the instructions provided to users. We included a simple instruction card for downloading the app and put the remainder of the instructions directly into the app, within context of the process, to guide the users through.



Key Finding III

Competitors provide more step-by-step guidance during onboarding and inline support when needed

How it informed our design solution

We added contextual guidance along each step of the onboarding process, making each step simple and clear. In doing this, users don't have to read any more than they need to, and they are more supported along the way. We also included links to get help at any step of the process for those who need it.



Key Finding IV

While community is valued in beekeeping, users weren't aware or not using BroodMinder community features.

How it informed our design solution

We made the community aspects more discoverable by including a notification to complete a community profile directly on the home page that new users will see right after creating their account. We also reduced the navigation elements and made community a primary navigation point.

Personas

The research we conducted highlighted **two clear user personas** who have distinct goals and motivations for beekeeping.

While there is an emerging group of younger hobbyist beekeepers like persona, Stephanie, who tend to be quite tech savvy, we had to ensure that we were designing for beekeepers like persona, Bill, who are slightly less tech savvy and make up a greater percentage of active beekeepers in the US.

This constraint helped us make design decisions that ultimately resulted in a more seamless user experience for all beekeepers regardless of their tech-savviness or experience.



Bill

Hobbyist Beekeeper, 10 years

ABOUT

- 👤 Age 65
- 🏠 Snohomish, WA
- 🎓 Bachelor's in Engineering
- 💰 Prior to retirement, was earning \$200K

BIO

Before retiring and becoming a hobbyist beekeeper, he worked as an engineer at a software company fulltime. He started beekeeping because he was intrigued by the challenge; however he has continued his pursuit as now he finds it meditative and relaxing. He has participated in a local beekeeping club for the past 8 years and enjoys mentoring new beekeepers in the community. He likes trying out new beekeeping devices, including the BroodMinder products.

"To me it's a little like watching puppy or kitten or baby videos. It's just a fascinating thing to watch these little creatures and all the things they do."

TECHNICAL BACKGROUND

He uses a mobile phone primarily for calls, and has access to computers. Also, he is familiar with some bluetooth/IOT products but doesn't use them. He dabbled with creating his own monitoring system in his earlier years.

NEEDS/GOALS

- He enjoys the meditative process of beekeeping and maintaining a hive.
- He wants to have sustainable solutions for understanding his hive and hive needs.
- He doesn't want to open his hive often and disrupt the bees, so he needs solutions that mitigate that.
- He wants to be able to communicate with other beekeepers to learn from them on tips and tricks on how they insulate and monitor their hives

PAIN POINTS

- Because he doesn't keep up with the latest mobile technology, he finds it difficult to use apps/set-up devices and eventually stops using them.
He finds it difficult to sift through all the noise of beekeeping information to find what really works.



Stephanie

Hobbyist Beekeeper, 6 months

ABOUT

- 👤 Age 32
- 🏠 Madison, WI
- 🎓 Bachelor's in Biology
- 💰 \$90K

BIO

Stephanie is a Senior Project Manager at a start-up and works fulltime. She indulges in her beekeeping hobby whenever she has time in the evenings or on the weekends. She first became intrigued with beekeeping after learning about it from a friend who kept bees. She watched videos on YouTube to get started, and continues to use YouTube as her main source of information when she has questions about her two hives.

"It would be handier if the user interface on the app was better, so that I could get better information as I am out there in the hive!"

TECHNICAL BACKGROUND

Very tech savvy, uses a smartphone daily for browsing social media, work email, and other apps. Uses IoT devices frequently including an Amazon Alexa.

NEEDS/GOALS

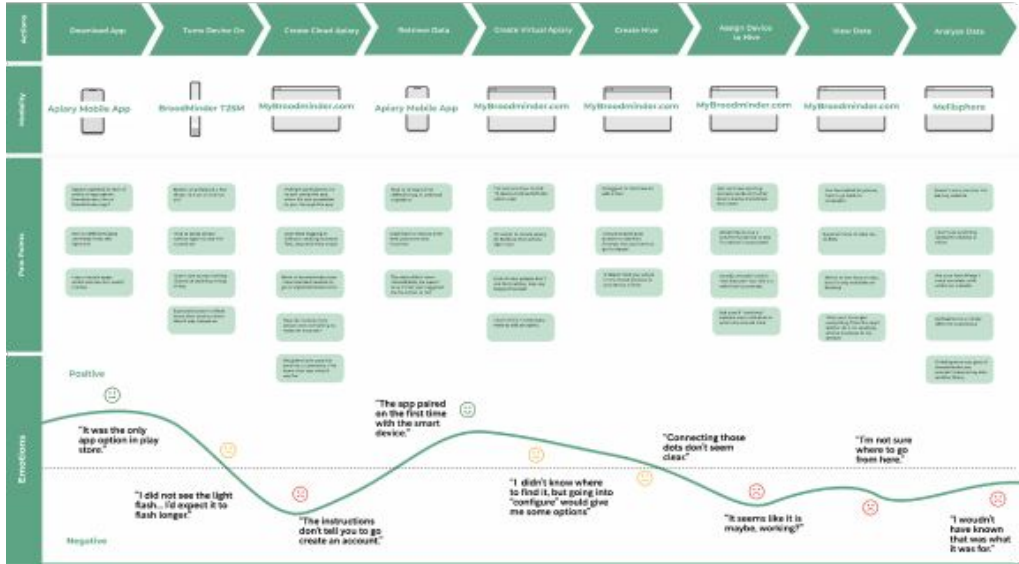
- She finds the challenge of keeping bees exciting, and is eager to learn more about them.
- She wants more information on what to do next after she gets the data from her BroodMinder device.
- She would like to find an easily accessible mentor who is experienced.

PAIN POINTS

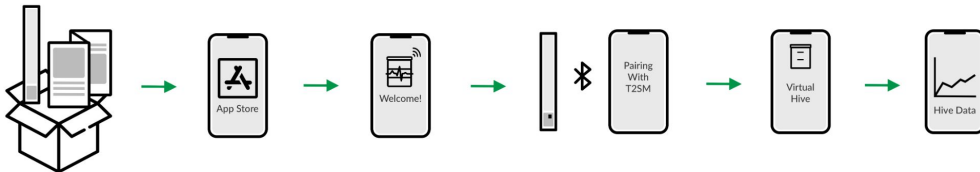
- Finds current BroodMinder app interface dated and unhelpful.
- Has difficulty pairing device, as it often unpairs.
- Would like to understand what the data means from the BroodMinder device.
- Isn't privy to joining "Beekeeping Facebook Groups", currently prefers using YouTube for information and trouble shooting.

She uses the BroodMinder T2SM and

Journey Mapping



Recommended User Flow



Due to the complexity of the existing onboarding process, we used journey mapping to help us visualize the steps that customers go through and the various emotions they experience along the way.

From our auto-ethnographic study and usability testing, we discovered that while there was a recommended path that customers take when onboarding, **unclear directions led to users straying from the path and fumbling their way through the process.**

Visualizing the steps and pain points helped us draft a simplified and idealized user journey prior to generating solution ideas.

Design Process

- Design Process Overview
- Sketching
- Mid-fidelity Prototyping
- Mood Boarding
- Visual Design
- High-fidelity Prototyping



Design Process Overview

We went through 3 different rounds of iteration and testing our designs to get feedback and refine as we gradually increased fidelity.

Round 1

High-volume Sketching • Peer Feedback

We conducted several rounds of rapid sketching as a group to help us quickly generate as many unique ideas as possible.

From these sketching sessions, we selected some of the best ideas and shared them with our peers to get quick directional feedback.

Round 2

Mid-fi Prototype • 4 Usability Tests

From the feedback received on our early sketches, we increased the fidelity and created a mid-fidelity prototype in Figma focused solely on the UX and interactions.

We tested our mid-fidelity click through prototype with 4 participants to identify areas of confusion and frustration.

Round 3

High-fi Prototype • 5 Usability Tests

Finally, we made UX improvements to our prototype and added our newly established visual design to increase the fidelity prior to testing again.

We tested our high-fidelity prototype with 4 beekeepers to identify any final areas in which we could improve before creating our final product.

Sketching

We performed multiple rounds of sketching, starting with the **crazy 8's method**. With this method, each person folds a paper into 8 sections and then rapidly sketches as many ideas as they can within 8 minutes. We did crazy 8's sketching rounds for each of the primary identified experience checkpoints (app download, account creation, device pairing, creating a virtual hive, and viewing hive data).

After sketching and sharing our thinking behind each of our sketches, we each sketched a complete onboarding process. We shared our refined sketches with our peers to get feedback prior to moving onto the next level of fidelity.



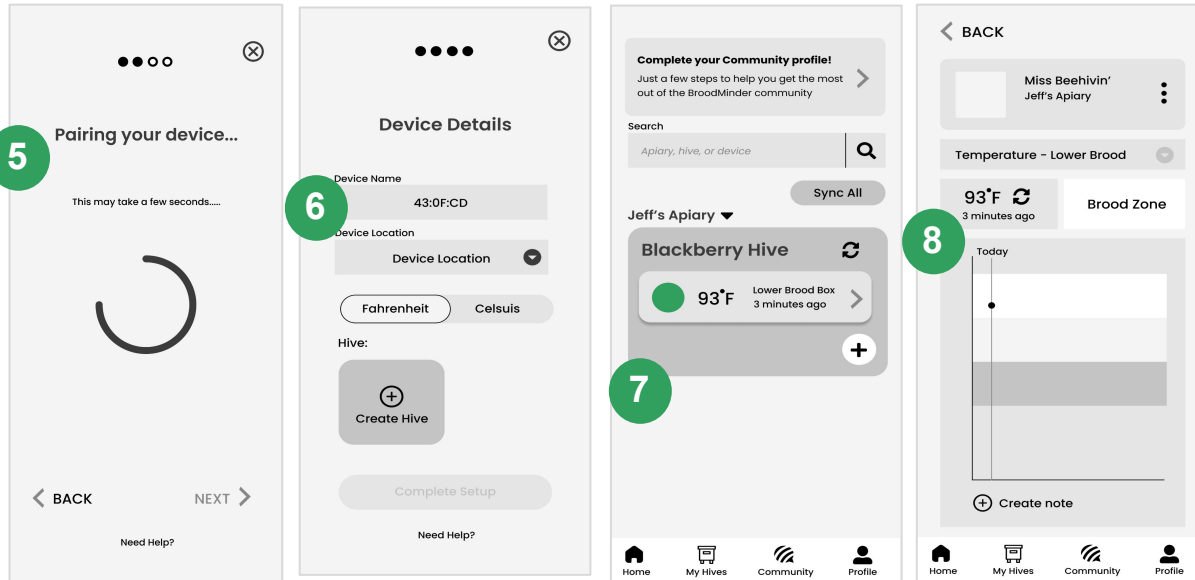
Prototype 1: Mid-Fidelity

The image shows four sequential mobile app screens:

- Screen 1:** "Welcome to BroodMinder". It features a registration form with fields for First Name (Jeff), Last Name (Beeman), Email (JeffB@gmail.com), and Password (masked with dots). Below the form is a link for "Terms and Conditions" and a "Create Account" button.
- Screen 2:** "Hi Jeff, we could not be happier to see you!". It asks "What would you like to do now?" and offers two options: "Add device" and "Explore BroodMinder".
- Screen 3:** "Which BroodMinder device would you like to pair?". It prompts the user to "Select your device" and shows four placeholder images for device selection. A "BACK" button is on the left and a "NEXT >" button is on the right. A link "I don't see my device?" is at the bottom.
- Screen 4:** "Grab your device!". It instructs the user: "Press the black button on your monitoring device for 5 seconds. Press next when the light is flashing." It shows a placeholder for a video animation. A "BACK" button is on the left and a "NEXT >" button is on the right. A link "Need Help?" is at the bottom.

- 1 Create an account**
Users go through a standard account creation before beginning device setup.
- 2 Setup or Explore selection**
Users can select to set up a new device or skip to explore their account first and do setup later.
- 3 Device type selection**
User sees a list of BroodMinder device images and selects the one they will be setting up.
- 4 Put device into pairing mode**
Users will be shown through a video how to put their device into pairing mode, as this was a common point of confusion in previous testing.

Prototype 1: Mid-Fidelity



5 Pairing device indication
Users know their device is pairing by the moving loading circle.

6 Customize device & add a hive
Users can change their device name and other details and assign it to a new hive.

7 Account home screen
On their home screen, users can view all of their hives, click in to view hive data and are prompted to complete a community profile.

8 Hive data screen
Users can look at their hive data over time and resync to retrieve the most recent temperature reading.

Improvements from Prototype 1 to Prototype 2

Changed some of the words used to be more clear to users.

Some participants got confused by the some of the words used in the process like 'device' and 'pair'. We changed the wording used throughout the process to words or descriptions that make more sense to the audience.

Added images and gifs as visual cues throughout the process.

Our participants liked visual cues to help them vs having to read everything. We added in a gif of a device being put into pair mode to better aid users in knowing where and how to press. We also added in a gif of a device being placed in a hive.

Eliminated unnecessary steps and screens with automated transitions

We removed an unnecessary step by advancing the device pairing screen automatically after pairing has successfully been completed. Rather than users having to tap the next button, the system does it for them.

Added a selection slider in the data visualization.

In the hive data screen, we added the ability to drag the data line by moving it back and forth with your finger. This allows users to more easily select a time in which they want to see specific temperature data for.

Made a clearer progress indicator at the top.

We had previously used a row of dots as the progress indicator throughout the process. This confused some participants and some thought that it was clickable. We changed the indicator marks to a rectangular shape.

Added visual design with a modern look and feel.

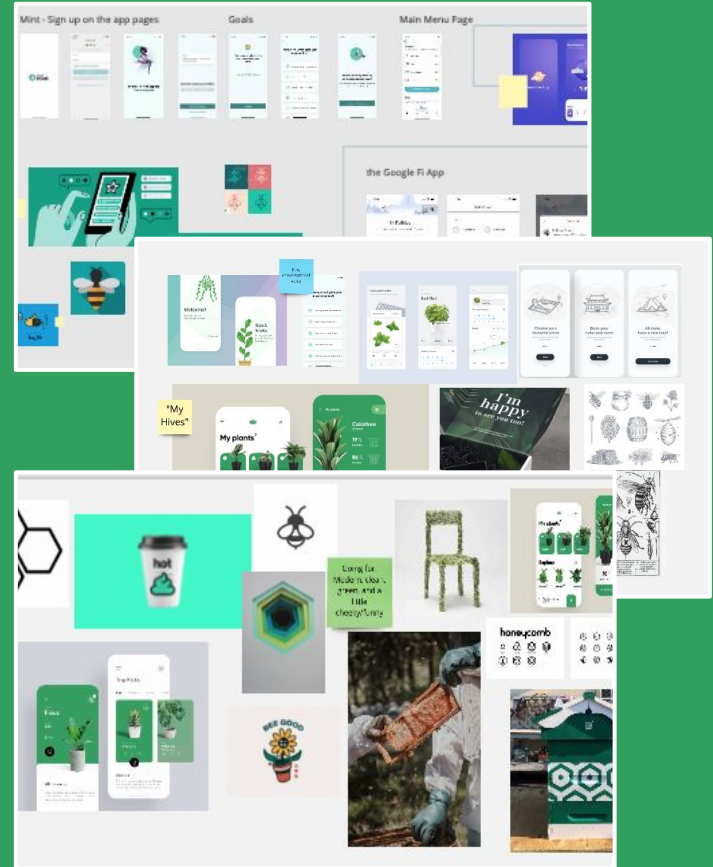
We landed on a clean design with a refreshed green color to modernize the app. We also added in some beekeeping related icons and sketches to add some fun visual interest and make it look polished.

Mood Boarding

Prior to deciding on the visual design direction that we wanted to use, we decided to do some mood boarding in order to identify some styles that we collectively liked.

We each created a mood board with inspiration that we found for colors, imagery, app style, fonts etc. After sharing and discussing our mood boards, we created a collaborative mood board that captured styles and ideas that we all agreed upon.

We wanted to change up the green color that BroodMinder uses with a **more refreshed green**. Overall, we wanted our app to be very **clean, minimalistic** with a good amount of white space, and use some sort of **graphics to add visual interest**.



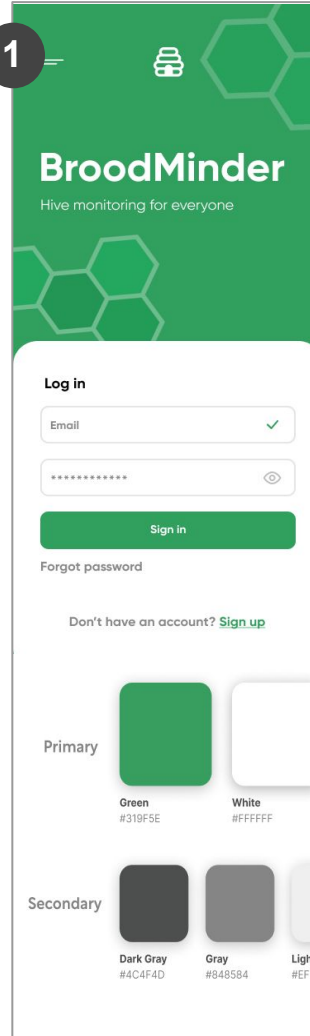
Visual Design

After our mood board exercise, we came up with two distinct visual design directions that we felt would elevate and modernize the overall look and feel of the BroodMinder app. One option focused more on the BroodMinder green with a modern feel while the other option incorporated bee-related sketches to add some visual interest.

After doing some quick preference testing with colleagues, we decided that the second design option looked and worked the best. We picked a new more refreshed green color to use as our primary CTAs and incorporated a light mint color as an accent. **Overall, our goal was to keep things very clean and simple while having some fun with the beekeeping theme.**

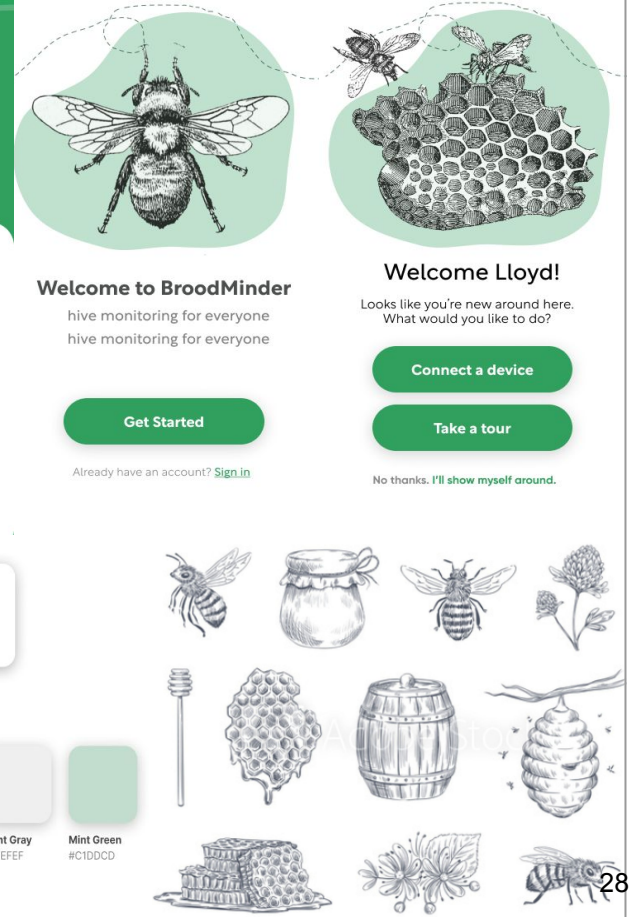
Design option 1 -
clean & modern

1

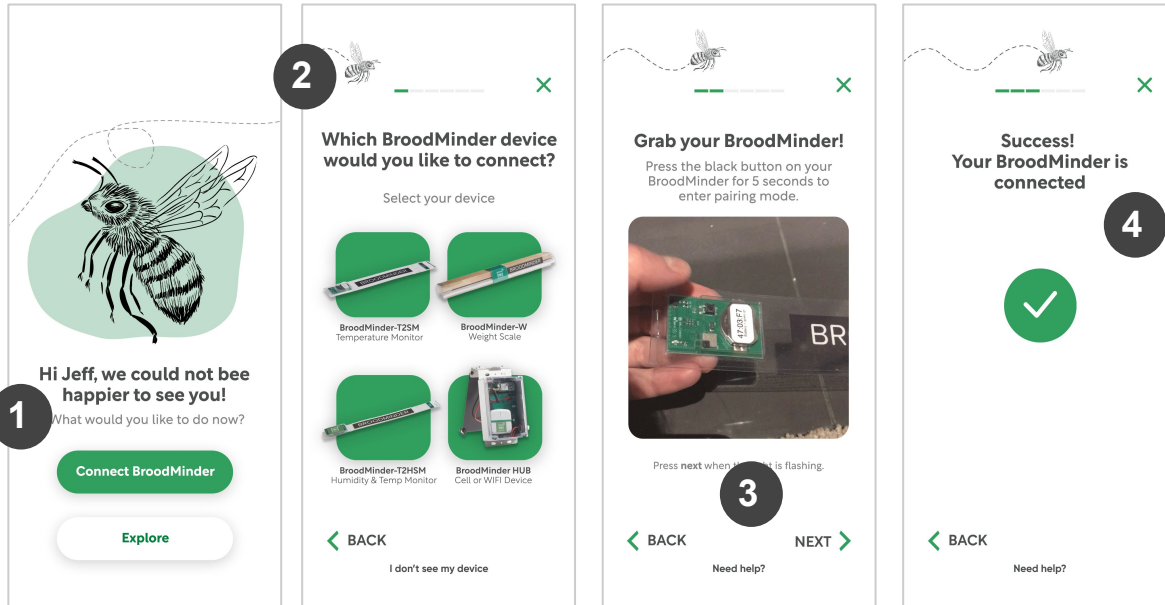


2

Design option 2 -
bee sketches



Prototype 2: High-Fidelity



1 Setup & Explore Section

New branding of vintage bee illustrations implemented and updated button titles to clarify user actions.

2 Device Selection

Large images of devices options added with labels below. Updated progress bar design of a bee implemented to mimic the onboarding time and show the user how many steps is left.

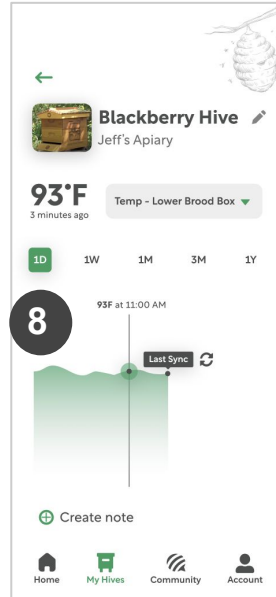
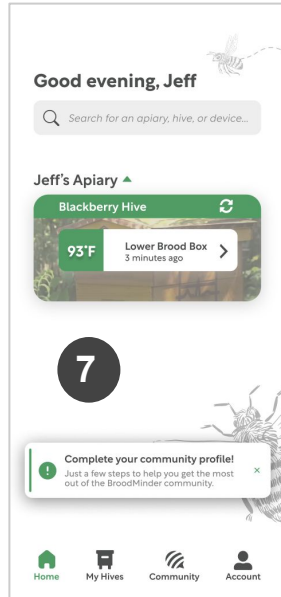
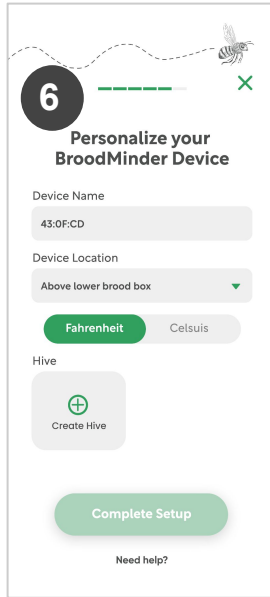
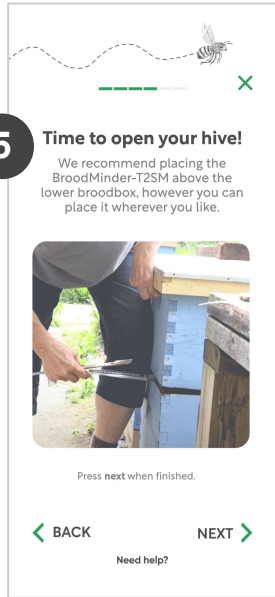
3 Activate Device

GIF added of how to turn device on. Shows customer holding button down for 5 seconds until light on device blinks red.

4 Device Pairing Complete

Easy to read message to user that device was paired (automatically with bluetooth once it was activated).

Prototype 2: High-Fidelity



Annotations

- 5 Placing Device**
GIF of how to place device in hive. This a potentially confusing step for new users, we found a visual was helpful.
- 6 Personalize Device**
User can rename their device, location and create a hive. User must create a hive before Complete Setup button is activated.
- 7 Account Home Screen**
After hive is create, the home screen appears. Features user's devices listed with current temperature & option to create their community profile.
- 8 Hive Data Screen**
Visually appealing graph to help users easily see their hive data. Includes refresh sync button for user convenience.

Improvements from Prototype 2 to Final Prototype

Added a pop-up allowing user to turn on Bluetooth.

This pop-up allows the user to turn Bluetooth on before activating their device. We also added more description to make it more clear to the user about how the device is being paired.

Added a “Next” button on the pairing screen.

We added a “Next” button to the pairing screen instead of automatically moving onto next page. This gives users more control to move on through the process when they’re ready.

Added a frequently asked questions page, found under help.

When the user runs into difficulty they have the option to click “Need help?” at the bottom of the screen. This prompts a FAQ list page with an option to compose email to BroodMinder customer service.

Updated location of “+” button to top of the screen.

Moved “+” button to the top of the screen so it doesn’t move when users add more hives. This also provides for flexibility, in that the “+” button can mean you’re adding a hive, device, or apiary.

Updated wording on device location.

We updated the name of the drop down menu from “Device location” to “Location in Hive” on the create hive screen, to reduce confusion about the term “location”.

Update Navigation bar; removed “My Hives”.

We updated the navigation bar by removing the “My Hives” icon, which was similar to the home page, therefore confusing to users. After removal, we updated the navigation bar design to balance out the remaining three icons.

Final Design

- Product Unboxing
- Seamless Onboarding
- Product Demo



Product Unboxing

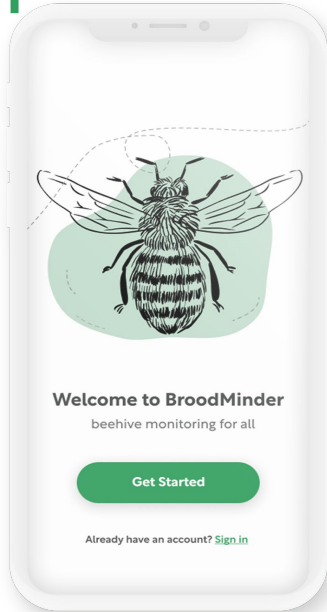


1 The box users receive in the mail
We designed packaging that is sturdy for the shipment journey, and delights the new customer when they receive it.

2 Instruction card that comes in the box
Instead of two different instruction guides as found in the original design, one simple consolidated instruction card will direct new users to the BroodMinder app.

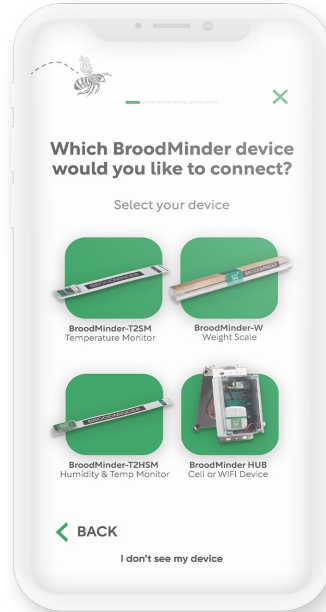
3 The BroodMinder hive monitoring device
The hive monitor would be nestled under the instruction guide, secured with brown packaging paper so it's not moving around during the shipment journey.

Seamless Onboarding



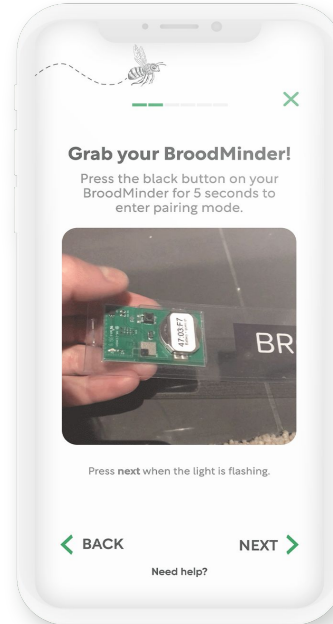
App Welcome Screen

Users open the BroodMinder app for the first time and can either get started or sign in.



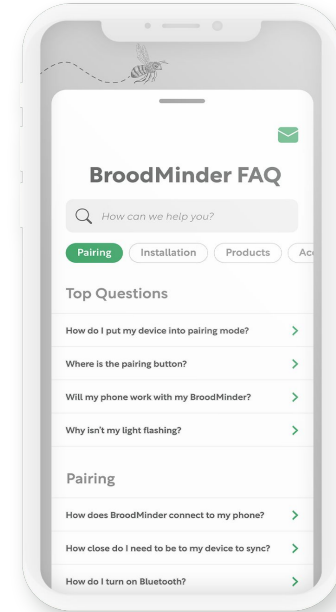
Select BroodMinder Device

Device options are shown with pictures so that users can easily select the device that they are setting up.



Pair Device Gif

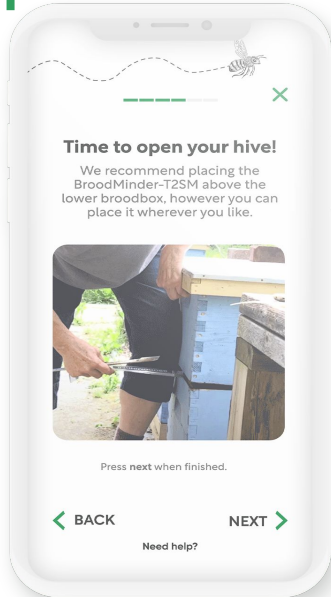
A GIF is shown of the device being put into pair mode, showing exactly where the user should press and what to expect.



FAQ Page for Help

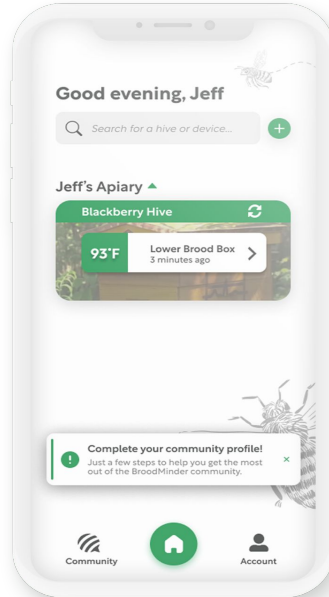
If at any point the user gets stuck, they can click 'need help?' to see this FAQ to help them troubleshoot.

Seamless Onboarding



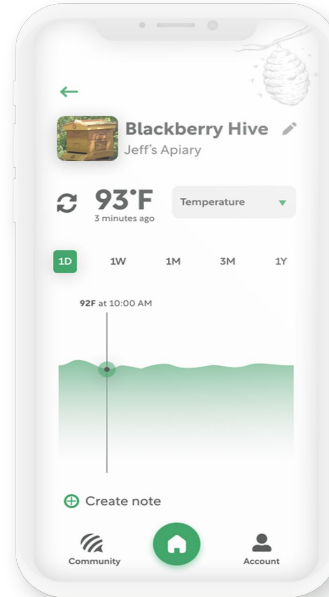
Place Device in Hive GIF

Users will see a GIF showing someone placing the device in a hive so they know how and where to place it.



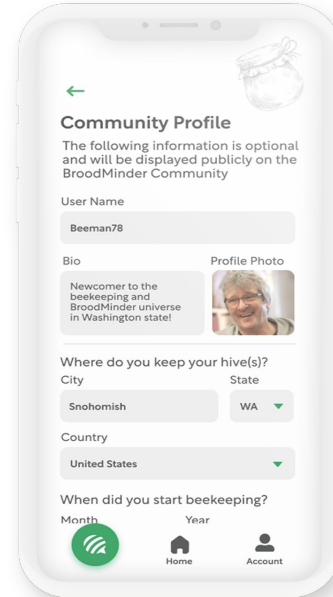
Account Home Screen

Users will come to their account home page and see the option to set up their community profile or view their hive data.



View Hive Data

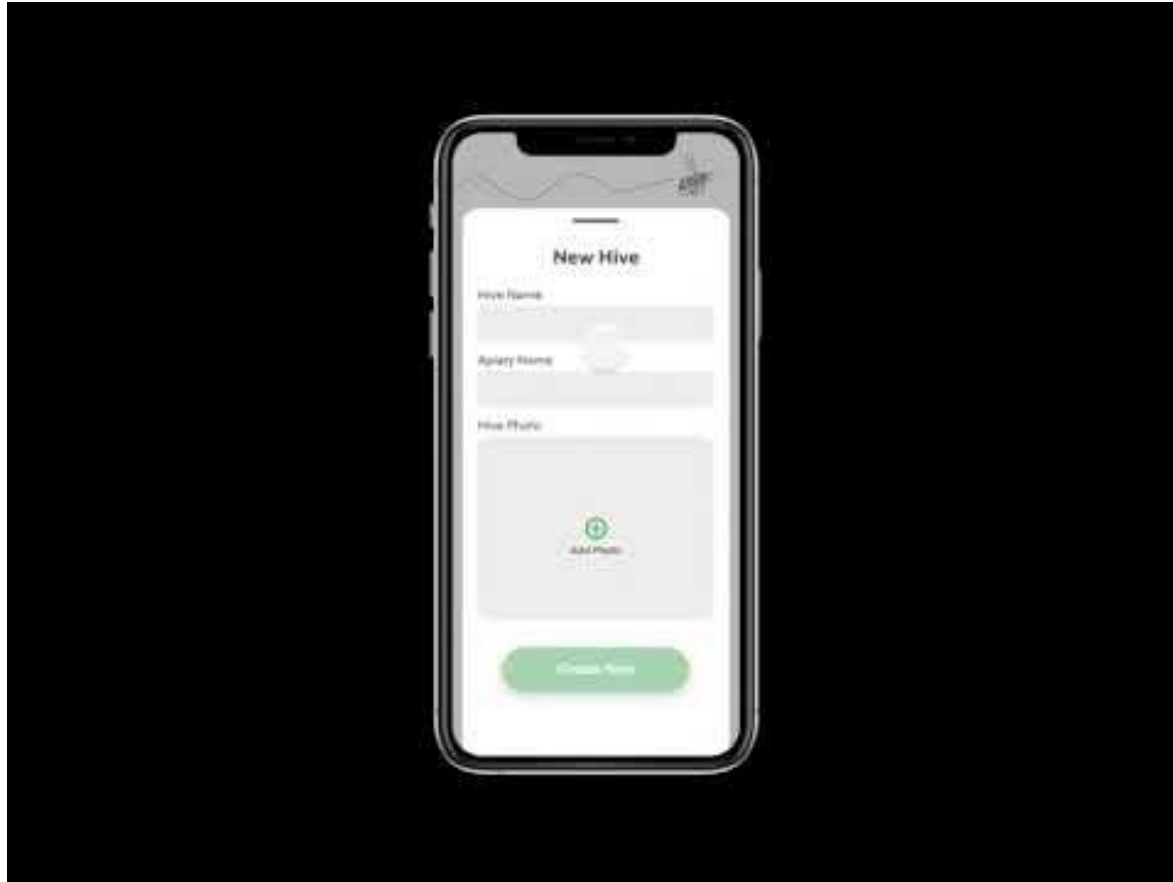
Users can see hive temperature over time, refresh to get the most recent data and log notes when checking in on their hive.



Community Profile Setup

Users can create a community profile that will be public to other BroodMinder users. This introduces them to mentorship, shared data, a forum and more.

Product Demo



Future Outlook

 Future Directions



Future Directions

Offline solution for people who don't have access to an internet connection when setting up.

Our current onboarding and setup process relies on beekeepers being near wifi. While it seems most likely that setup would occur in home where wifi is located, we'd like to explore an alternative option that can work well for those who are doing their setup outside near their beehives.

Solve for displaying multiple variables of hive data.

We focused on the setup of the temperature monitoring device which only shows one variable of data. We'd like to explore what it looks like when a hive has multiple monitors and variables including humidity and weight. We would need to make it easy for users to toggle between variables and understand how they relate to each other.

Scaling for multiple hives and apiaries.

Because our focus was on the experience of first time users, our design incorporated just one hive. We would like to explore what it looks like for a user who has multiple hives and apiaries. We would want to provide users with a way to organize their hives visually so that they can distinguish between them easily.

Explore the 'add a note' feature within hives.

We heard from beekeepers that they tend to take notes each time they check in on their hives. We included an 'add note' affordance but would like to further explore what that interaction would look like and how they are catalogued so that users can easily look back through their notes on specific dates.



Thank You!

Appendix



Data & Document Links

Research

[Miro Board](#)

[Auto-Ethnography Study](#)

[Competitive Analysis](#)

[Usability Study 1](#)

[Customer Interviews](#)

[Personas](#)

[Journey Maps](#)

[Usability Study 2](#)

Design

[Miro Board](#)

[Prototype 1: Mid-Fidelity](#)

[Prototype 2: High-Fidelity](#)

[Final Prototype](#)

[Final Deliverable](#)